

The opinion in support of the decision being entered today was *not* written for publication and is *not* binding precedent of the Board.

Paper No. 28

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte SHINGO KADOMURA, KEI TAKATSU,
SHINSUKE HIRANO and NOBUYUKI SUZUKI

Appeal No. 2002-1401
Application No. 09/187,226

HEARD: April 15, 2003

Before OWENS, KRATZ, and JEFFREY T. SMITH, *Administrative Patent Judges*.

OWENS, *Administrative Patent Judge*.

DECISION ON APPEAL

This appeal is from the final rejection of claims 1-7, 9-22 and 24-26, which are all of the claims remaining in the application.

THE INVENTION

The appellants claim an aluminum nitride/aluminum base composite material and a method for making it. Claim 13 is illustrative:

13. An aluminum nitride/aluminum base composite material, which comprises:

 said aluminum nitride/aluminum base composite material,
being produced by the steps of:

(A) charging aluminum nitride powder particles into a container provided in a molten metal pressure apparatus;

(B) applying pressure to the aluminum nitride powder particles in the container;

(C) pouring a molten aluminum base material into the container; and,

(D) applying pressure to the molten aluminum base material in the container to fill the aluminum base material in a space between the aluminum nitride powder particles,

wherein a pore ratio of said composite material is minimized by providing said aluminum nitride particles with a first set of particles having an average particle size of R, and a second set of particles having an average particle size ranging from 3R to 5R, where a volume concentration of said first set of particles is between 3 and 5 times a volume concentration of said second set of particles.

THE REFERENCES

Premkumar et al. (Premkumar)	5,775,403	Jul. 7, 1998
Young	5,941,297	Aug. 24, 1999
		(filed Sep. 23, 1996)
Siemens AG (FR '878) ¹	2,028,878	Oct. 16, 1970
(French patent application)		

THE REJECTIONS

Claims 15-18 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the appellants regard as the invention. Claims 1-7, 9-22 and 24-26 stand rejected under 35 U.S.C. § 103 as follows: claims 1, 2, 7, 9-11,

¹ Citations herein to FR '878 are to an English translation thereof, a copy of which is provided to the appellants with this decision.

Appeal No. 2002-1401
Application No. 09/187/226

13, 14 and 25 over Premkumar in view of Young; claims 3-6, 12, 19, 20 and 26 over Premkumar in view of Young and the appellants' admitted prior art; and claims 15-18, 21, 22 and 24 over Premkumar in view of Young, the appellants' admitted prior art and FR '878.

OPINION

We reverse the rejection under 35 U.S.C. § 112, second paragraph. The rejections under 35 U.S.C. § 103 are reversed as to claim 1-7, 10, 15-18, 21, 22 and 24-26, and affirmed as to claims 9, 11-14, 19 and 20. Under the provisions of 37 CFR § 1.196(b) we enter a new ground of rejection of claims 21, 22 and 24.

Rejection under 35 U.S.C. § 112, second paragraph

Element (b) in the appellants' claim 15 is "a covering layer, consisting of a ceramic material comprising aluminum and TiO₂, and covering a surface of the composite material." The examiner argues that "since aluminum is not a ceramic material, it renders the meaning of the claim language vague and indefinite" (answer, page 5).

It is proper to use the specification to interpret what the appellants mean by "ceramic material comprising aluminum". See *In re Morris*, 127 F.3d 1048, 1053-56, 44 USPQ2d 1023, 1027-30 (Fed. Cir. 1997). The aluminum-containing ceramic materials

exemplified in the specification are Al_2O_3 and AlN (page 13, lines 2-3 and 7; page 14, lines 21-22; page 15, lines 12-13). Thus, it is clear from the specification that what the appellants mean by "ceramic material comprising aluminum" is a ceramic material containing aluminum as a component of the ceramic material. Accordingly, we reverse the rejection under 35 U.S.C. § 112, second paragraph.²

Rejections under 35 U.S.C. § 103

Claims 9 and 12

Premkumar discloses a method for making a metal matrix composite which can be an aluminum nitride/aluminum base material (col. 2, lines 36-53; col. 3, line 62). The method includes preparing a preform having pores by sintering a powder which can be aluminum nitride powder, enclosing the preform in a container provided in a molten metal pressure apparatus, pouring molten aluminum base material into the container, and applying pressure to the molten aluminum base material in the container to infiltrate the aluminum base material into the pores of the preform, thereby obtaining a base material (col. 2, lines 36-53;

² The examiner also argues that there is no support in the specification for "ceramic material comprising aluminum". This issue should have been raised under the 35 U.S.C. § 112, first paragraph, written description requirement rather than 35 U.S.C. § 112, second paragraph. Regardless, the examiner has not established that the above-discussed disclosures of Al_2O_3 and AlN fail to provide adequate written descriptive support for "ceramic material comprising aluminum".

col. 5, lines 9-13 and 15-19; col. 6, line 65 - col. 7, line 3; figures 1 and 1a). The appellants acknowledge that it was known in the art to cover the surface of such base materials with a ceramic material such as Al_2O_3 or AlN to improve the resistance to oxidation and corrosion (specification, page 1, lines 28-33).

The appellant states that "[c]laim 9 recites a range of average particle sizes for the aluminum nitride powder that makes up the preform" (brief, pages 12-13). Actually, the appellants' claim 9 recites that "a particle size of said aluminum nitride powder is in a range from 10 to 100 μm ". That is, the claim requires that at least one of the aluminum nitride particles is in the 10-100 μm range.

Premkumar does not disclose the powder particle size. However, Premkumar discloses using the powder to make electronic packages having very tight tolerance in dimension (as low as 0.001 inch) and surface flatness (0.001 inch) (col. 8, lines 46-56), and teaches that using a distribution of particle sizes results in interstitial filling needed for substantially porosity free metal matrix composites (col. 5, lines 54-63). These disclosures would have fairly suggested, to one of ordinary skill in the art, use of a range of small particles, such as a range having at least one 10-100 μm particle, to obtain electronic package-size pore free metal matrix composites having the desired low dimension and surface flatness tolerances.

Accordingly, we affirm the rejection of claim 9 and claim 12 which depends therefrom.³

Claims 11, 19 and 20

The appellants' claim 11, which depends from claim 9, and independent claim 19 limit the difference in linear expansion coefficient between the base material and the ceramic covering layer.

Premkumar teaches that the coefficients of thermal expansion of his metal matrix composites approach or match that of alumina (col. 8, lines 46-51). Consequently, the coefficients of thermal expansion of these metal matrix composites approach or match that of the admitted prior art covering layer made of alumina (specification, page 1, lines 32-33). Hence, the appellants' argument that the recited linear expansion coefficient relationship is not suggested by the applied prior art is not well taken (brief, pages 15-17).

We therefore affirm the rejection of claims 11, 19 and 20 (which depends from claim 19).⁴

³ The appellants state that claims 9 and 12 stand or fall together (brief, page 6).

⁴ The appellants do not argue the limitation in claim 20 that the aluminum base material is pored into the container together with silicon lumps. Because this claim is in product-by-process form, the patentability of the claimed invention is determined based on the product itself, not on the method of making it. See *In re Thorpe*, 777 F.2d 695, 697, 227 USPQ 964, 966 (Fed. Cir. 1985). It reasonably appears that Premkumar's

Claims 13 and 14

The appellants' claim 13 requires that the pore ratio of the composite material is minimized by using aluminum nitride particles having first and second particle sizes, wherein the particles having the first particle size, R , are present in 3-5 times the volume concentration of the particles having the second particle size, $3R$ to $5R$.

The appellants argue that Premkumar "is silent regarding the particle size that should provide the advantages of successfully controlling the porosity of the composite material or base material" (brief, page 14).

Actually, Premkumar discloses that substantially porosity free metal matrix composites can be produced by using particles having a distribution of sizes so as to obtain interstitial filling (col. 5, lines 54-63). This disclosure of interstitial filling would have indicated to one of ordinary skill in the art that the small particles, which fill in the spaces between the large particles, must be present in a relatively large volume fraction. Given this disclosure, the optimum relative sizes and volumes of the particles recited in the appellants' claim 13 would have been determinable by one of ordinary skill in the art

aluminum-silicon alloy (col. 2, lines 42-44) is the same or substantially the same as that obtained by mixing the appellants' silicon lumps with the aluminum base material, and the appellants have provided no evidence or argument to the contrary.

through no more than routine experimentation. See *In re Boesch*, 617 F.2d 272, 276, 205 USPQ 215, 219 (CCPA 1980); *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

Hence, we affirm the rejection of claims 13 and 14.⁵

Claims 1-6, 25 and 26

The examiner argues that Premkumar "substantially" shows the claimed invention except for the step of pressurizing the reinforcing material (answer, page 4). Actually, that step is disclosed in Premkumar's claim 8.

The appellants' independent claims 1 and 3 require that all of the recited steps are carried out in the same container. The examiner has not explained how Premkumar and Young would have fairly suggested this feature to one of ordinary skill in the art. Consequently, we reverse the rejection of these claims and dependent claims 2, 4-6, 25 and 26.

Claims 7 and 10

Claims 7 and 10 require that molten aluminum base material is poured into a container together with silicon lumps. The examiner argues, in view of Premkumar's disclosure of an aluminum-silicon alloy matrix material (col. 2, lines 42-44), that "whether the silicon is incorporated into the base material

⁵ The appellants state that claims 13 and 14 stand or fall together (brief, page 6).

before pouring or during pouring is deemed to be nothing more than an obvious choice of design since the final composition of the base material is the same" (answer, page 4). Although the appellants have challenged this argument (brief, page 17), the examiner has provided no supporting evidence. Consequently, we reverse the rejection of claims 7 and 10.

Claims 15-18

Claim 15 requires a covering layer consisting of 1) TiO_2 and 2) a ceramic material comprising aluminum. The appellants acknowledge that it was known in the art to cover composite materials with a layer of a ceramic material such as Al_2O_3 or AlN to increase the resistance to oxidation or corrosion (specification, page 1, lines 28-33).

The examiner argues that in view of the disclosure in FR '878 of increasing the abrasion resistance of an aluminum or aluminum alloy substrate by coating it with TiO_2 , it would have been obvious to one of ordinary skill in the art to coat Premkumar's base material with TiO_2 to obtain increased abrasion resistance (answer, page 5).

The FR '878 aluminum or aluminum alloy substrate is an ultrasound weld electrode or electrode insert for ultrasound welding (page 1). A coating of a material such as Al_2O_3 or TiO_2 is applied to the substrate to increase its abrasion resistance

and ensure good transmission of ultrasounds (page 5).

Premkumar's substrate, however, is a metal matrix composite having high thermal conductivity coupled with a coefficient of thermal expansion which approximates those of ceramics and semiconductor materials typically used in electronic packaging (col. 2, lines 31-36).

For a *prima facie* case of obviousness to be established, the teachings from the prior art itself must appear to have suggested the claimed subject matter to one of ordinary skill in the art. See *In re Rinehart*, 531 F.2d 1048, 1051, 189 USPQ 143, 147 (CCPA 1976). The examiner has not explained why the disclosure in FR '878 of coating an aluminum or aluminum alloy ultrasound weld electrode or electrode insert with Al_2O_3 or TiO_2 would have fairly suggested, to one of ordinary skill in the art, coating with TiO_2 Premkumar's substrate which is a different material (metal matrix composite versus aluminum or aluminum alloy) having different desired properties (high thermal conductivity coupled with a coefficient of thermal expansion which approximates those of ceramics and semiconductor materials typically used in electronic packaging, versus abrasion resistance and good transmission of ultrasounds). Hence, the examiner has not carried the initial burden of establishing that the teachings of the references

themselves appear to have suggested the claimed subject matter to one of ordinary skill in the art.

We therefore reverse the rejection of claim 15 and claims 16-18 which depend therefrom.

Claims 21, 22 and 24

The appellants' independent claim 21, and claims 22 and 24 which depend therefrom, require, between the base material and the covering layer, an intermediate underlayer comprising about 5% nickel.

FR '878 discloses a nickel nitride or nickel aluminide adhesive layer between an aluminum or aluminum alloy substrate and an abrasion resistant layer of a material such as Al_2O_3 or TiO_2 (pages 1, 5 and 6).

The examiner argues that FR '878 teaches that the adhesive layer provides better matching of the linear expansion coefficient between the aluminum or aluminum alloy substrate and the abrasion resistant layer (answer, page 9). This teaching clearly is not in the abstract relied upon by the examiner; nor is it in the FR '878 translation. The examiner also makes the unsupported argument that the coefficient of linear expansion of the FR '878 adhesive layer is between that of the substrate and the abrasion resistant layer (answer, pages 9-10).

The examiner has not established that FR '878 would have fairly suggested, to one of ordinary skill in the art, using the disclosed adhesion layer with a different substrate, i.e., Premkumar's aluminum nitride/aluminum composite rather than the FR '878 aluminum or aluminum alloy. Also, the examiner has provided no explanation as to why FR '878 would have led one of ordinary skill in the art to use an adhesion layer containing 5% nickel.

The examiner, therefore, has not carried the burden of establishing a *prima facie* case of obviousness of the aluminum nitride/aluminum base composite material claimed in the appellants' claims 21, 22 and 24. Accordingly, we reverse the rejection of these claims.

New ground of rejection

Claims 21, 22 and 24 are rejected under 35 U.S.C. § 112, first paragraph, as the originally-filed specification fails to provide adequate written descriptive support for the claimed invention.

The appellants' claim 21, and claims 22 and 24 which depend therefrom, require an intermediate layer comprising about 5% nickel. The specification, however, discloses "an underlayer consisting of nickel containing aluminum of approx. 5 % in weight (Ni-5 wt% Al)" (page 13, lines 15-17 and page 14, lines 32-34).

Appeal No. 2002-1401
Application No. 09/187/226

Thus, the specification discloses an intermediate layer containing 5 wt% aluminum, not 5 wt% nickel.

DECISION

The rejection of claims 15-18 under 35 U.S.C. § 112, second paragraph, is reversed. The rejection under 35 U.S.C. § 103 claims 1, 2, 7, 9-11, 13, 14 and 25 over Premkumar in view of Young is reversed as to claims 1, 2, 7, 10 and 25, and affirmed as to claims 9, 11, 13 and 14. The rejection under 35 U.S.C. § 103 of claims 3-6, 12, 19, 20 and 26 over Premkumar in view of Young and the appellants' admitted prior art is reversed as to claims 3-6 and 26, and affirmed as to claims 12, 19 and 20. The rejection under 35 U.S.C. § 103 of claims 15-18, 21, 22 and 24 over Premkumar in view of Young, the appellants' admitted prior art and FR '878 is reversed. Under the provisions of 37 CFR § 1.196(b) a new ground of rejection of claims 21, 22 and 24 has been entered.

In addition to affirming the examiner's rejection of one or more claims, this decision contains a new ground of rejection pursuant to 37 CFR § 1.196(b), by final rule notice, 62 Fed. Reg. 53, 131, 53, 197 (Oct. 10, 1997), 1203 Off. Gaz. Pat. & Trademark Office 63, 122 (Oct. 21, 1997)). 37 CFR § 1.196(b) provides, "A new ground of rejection shall not be considered final for purposes of judicial review."

Appeal No. 2002-1401
Application No. 09/187/226

Regarding any affirmed rejection, 37 CFR § 1.197(b)
provides:

(b) Appellants may file a single request for rehearing within two months from the date of the original decision ...

37 CFR § 1.196(b) also provides that the appellants, WITHIN TWO MONTHS FROM THE DATE OF THE DECISION, must exercise one of the following two options with respect to the new ground of rejection to avoid termination of proceedings (37 CFR § 1.197(c)) as to the rejected claims:

(1) Submit an appropriate amendment of the claims so rejected or a showing of facts relating to the claims so rejected, or both, and have the matter reconsidered by the examiner, in which event the application will be remanded to the examiner....

(2) Request that the application be reheard under § 1.197(b) by the Board of Patent Appeals and Interferences upon the same record....

Should the appellants elect to prosecute further before the Primary Examiner pursuant to 37 CFR § 1.196(b)(1), in order to preserve the right to seek review under 35 U.S.C. §§ 141 or 145 with respect to the affirmed rejection, the effective date of the affirmance is deferred until conclusion of the prosecution before the examiner unless, as a mere incident to the limited prosecution, the affirmed rejection is overcome.

If the appellants elect prosecution before the examiner and this does not result in allowance of the application, abandonment or a second appeal, this case should be returned to the Board of

Patent Appeals and Interferences for final action on the affirmed rejection, including any timely request for rehearing thereof.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a).

AFFIRMED-IN-PART, 37 CFR § 1.196(b)

)	
Terry J. Owens)	
Administrative Patent Judge)	
)	
)	
)	BOARD OF PATENT
Peter F. Kratz)	
Administrative Patent Judge)	APPEALS AND
)	
)	INTERFERENCES
)	
Jeffrey T. Smith)	
Administrative Patent Judge)	

TJO/eld

Appeal No. 2002-1401
Application No. 09/187/226

Page 16

Ronald P. Kananen
Rader, Fishman & Grauer
The Lion Building
1233 20th Stret N.W. Suite 501
Washington, DC 20036